

SECTION 08 17 13 INTEGRATED METAL DOOR OPENING ASSEMBLIES

GENERAL

1. **GENERAL NOTE**
 1. The General Conditions, Supplementary General Conditions, and Division 1 - General Requirements are hereby made a part of this Section as fully as if repeated herein.
2. **SUMMARY**
 1. Section Includes
 1. Integrated metal door opening assemblies with doors, frames, operating hardware, accessories, and installation for a complete assembly.
3. **RELATED SECTIONS**
 1. Section 01 33 00, Submittal Procedures.
 2. Section 01 25 13, Product Substitution Procedures.
 3. Section 06 20 00 Finish Carpentry
 4. Section 08 30 00 Specialty Doors and Frames
 5. Section 08 40 00 Entrances, Storefronts, and Curtainwalls
 6. Section 08 70 00 Hardware
 7. Section 08 80 00 Glazing
 8. Section 09 90 00 Painting and Coating
 9. Division 28 Electronic Safety and Security
4. **REFERENCES**
 1. ANSI/BHMA A156 Series, American National Standards Institute/ Building Hardware Manufacturers Association.
 2. ANSI/SDI - A250.8 Recommended Specifications for Standard Steel Doors and Frames, American National Standards Institute/Steel Door Institute, 2003.
 3. ANSI/UL 10C -- Positive Pressure Fire Tests of Door Assemblies, American National Standards Institute/Underwriters Laboratories, 2001.
 4. ASTM A1008 - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy with Improved Formability, American Society of Testing and Materials; 2004a.
 5. ASTM E2074 - Standard Test Method for Fire Tests of Door Assemblies, Including Positive Pressure Testing of Side-Hinged and Pivoted Swinging Door Assemblies, American Society of Testing and Materials, 2000.
 6. NFPA 80 - Standard for Fire Doors and Windows, 1999.
 7. NFPA 101 - Life Safety Code, National Fire Protection Association, 2003.
 8. NFPA 105 - Recommended Practice for Installation of Smoke Control Door Assemblies, 2007.
 9. SDI 111 A - Recommended Steel Door Frame Details, Steel Door Institute; 2002.
 10. SDI 112 - Zinc-Coated (Galvanized/Galvannealed) Standard Steel Doors and Frames, 1997.
5. **SYSTEM DESCRIPTION**
 1. Performance Requirements
 1. Integrated metal door opening assemblies: Exceed minimum performance standards.
 1. Steel Doors: In accordance with ANSI/SDI A250.8, Grade 1, but not less than 3,000,000 cycles.

Exit devices: Include following paragraph.

1. Exit Devices: Certified to meet ANSI/BHMA A156.3, Grade 1, but not less than 5,000,000 cycles.

Closers: Include following paragraph.

1. Closers: Certified to meet ANSI/BHMA A156.4, Grade 1, but not less than 5,000,000 cycles.

Mortise Locks: Include following paragraph.

1. Mortise Locks/Latches: Certified to meet ANSI/BHMA A156.13, Grade 1, but not less than 5,000,000 cycles.
2. **SUBMITTALS**
 1. Shop Drawings
 1. In accordance with Section 01 33 00.
 2. Indicate each door and frame condition; frame type, profile and installation detail; items of finish hardware, finishes and electrical rough-in requirements.
 2. Samples
 1. In accordance with Section 01 33 23.
3. **QUALITY ASSURANCE**
 1. Qualifications
 1. Manufacturer: Firm with not less than 5 years experience in fabrication of metal doors, frames, and hardware openings.
 2. Supplier:
 1. Authorized ASSA ABLLOY Door Security Solutions distributor.
 2. Have in employment a current member of the Door & Hardware Institute (DHI) who has obtained the professional credentials of an Architectural Hardware Consultant (AHC), Certified Door Consultant (CDC), Electrical Hardware Consultant (EHC), or Architectural Openings Consultant (AOC).
 3. Installer: Employed by supplier.
 2. Regulatory Requirements

Fire rated doors: Include following paragraph.

Rated door assemblies shall have been tested to meet conditions of NFPA 80 and UL 10B and UL 10C for neutral and positive pressure requirements. Provide products labeled and listed by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction.

Temperature rise doors: Include following paragraph.

1. Temperature rise door assemblies shall meet requirements for 450 degree rating.

DELIVERY, STORAGE AND HANDLING

- Packaging: Package units in manner to protect hardware, door, and frame contents and finishes through transport.
- Palletize units to allow movement via forklift.
- Delivery: Deliver to site in original unopened containers and pallets bearing system manufacturers name, and brand.

- Store: Horizontally on level surface, not less than 2 inches off floor in a clean, dry well-ventilated area protected from sunlight, extreme heat, dryness and moisture.
- Receiving, off loading, and site distribution shall be handled by an authorized ReadySet Distributor unless otherwise stipulated by contract. If the General Contractor or other entity handles all or any portion of the receiving, off loading, and site distribution, they are held responsible for any and all damages that may result from potential miss handling of the product.
 1. PROJECT CONDITIONS
 1. Do not bring door and frame units to site until building temperature and humidity ranges are compatible with recommended values for preservation of wood moisture content as listed by AWI AWQS. Building shall be stabilized at 30 to 60 percent humidity.
 2. WARRANTY
 1. Integrated metal door opening assembly: . [Recommend this be changed to an entire assembly limited warranty of at least 5-years]

PRODUCTS

6. MANUFACTURERS
 1. Integrated metal door assemblies
 1. ASSA ABLOY Door Security Solutions: www.assaabloyds.com.
 2. Substitutions: <<Refer to Section 01 25 13, Not permitted>>.
7. MATERIALS
 1. Frames
 1. In accordance with ANSI/SDI A250.8, SDI 111A, and SDI 112.
 2. Construction: <<All-welded unit, Inter-lock>> type.
 3. Material: Steel, cold rolled, ASTM A1008, 16 gauge.
 4. Fire Resistance Rating: As indicated in Door Schedule.
 5. Spreader Bar: Removable, at sill.
 6. Provide electrified openings with integrated ElectroLynx cable installed in the frame. See schedule for details.
 2. Frame Anchorage Devices
 1. To securely fasten to wall construction without distortion or stress.
 2. In accordance with fire resistance rating indicated in Contract Documents.
 3. Door Systems
 1. In accordance with ANSI/SDI A250.8.
 2. Provide electrified openings with integrated ElectroLynx cable installed in the door. See schedule for details.
 3. General Use, Interior
 1. Siles: Steel, 16 gauge, MIG spot welded.
 2. Cores: <<Honeycomb, Polystyrene, Polyurethane, Steel-Stiffened>>.
 3. Thickness: 1-3/4 inches.
 4. Faces: Steel, stretcher leveled, without seams or spot welds, <<20, 18, 16>> gauge.
 4. General Use, Exterior
 1. Siles: Steel, galvanized, 16 gauge, MIG spot welded.
 2. Cores: <<Solid polystyrene, Steel-Stiffened>>.
 3. Thickness: 1-3/4 inches.
 4. Faces: Steel, stretcher leveled, without seams or spot welds, galvanized and bonderized, <<18, 16, 14>> gauge.
 5. Fire Rated
 1. Siles: Steel, galvanized, 16 gauge, MIG spot welded.
 2. Top and Bottom Rails
 3. Cores
 1. <<Honeycomb, Polystyrene, Polyurethane, Steel-Stiffened>>.

Temperature Rise doors: Include following paragraph.

8. Thickness: 1-3/4 inches.
9. Faces
 1. Material: Steel, stretcher leveled, without seams or spot welds, galvanized and bonderized.
 2. Gauge
 1. At fire rated doors: <<20, 18, 16 - height and width restrictions may apply>>.

Temperature Rise doors: Include following paragraph.

10. At temperature rise doors: <<20, 18, 16 - height and width restrictions may apply>>.

Gasketing: Include following paragraph.

11. Gasketing

Fire rated doors: Include following paragraph.

12. U.L. approved for fire doors.
13. Jamb: Factory applied to latch/locking and full-height hinge channels.
14. Head: Factory applied.
15. Floor: Nylon thermal brush, shipped loose for field application.
16. Locations at doors indicated << Exterior, Fire Rated, Acoustical, Smoke Control, and Gasketed>>.

Doors with lites: Include following paragraph.

17. Lite Kits
 1. Material: Steel, cold rolled, galvanized, 16 gauge.
 2. Construction: Welded mitered corners.
 3. Projection: Not more than 1/16 inch beyond door face.
 4. Finish: Baked polyurethane.

Glazing: Edit following paragraphs

18. Glazing
 1. Wired Glass
 1. Fire Rating: Listed and labeled by UL for fire rating scheduled at opening locations when tested in accordance with ASTM E2010 and ASTM E2074.
 2. Thickness: 1/4 inch.
 3. Fire-rating: 20 to 90 minutes.
 4. Impact Safety Resistance: None.
 5. Surface Finish: Polished
 2. Clear Fire Rated (Ceramic) Glass
 1. Fire Rating: Listed and labeled by UL for fire rating scheduled at opening locations when tested in accordance with ASTM E2010 and ASTM E2074.
 2. Thickness: 3/16 inch.
 3. Fire-rating: 20 to 180 minutes.

4. Impact Safety Resistance: In accordance with ANSI Z97.1 Standard and Federal Standard CPSC 16 CFR 1201.
5. Positive Pressure Test: Passes In accordance with UL 10C.
6. Surface Finish: Polished
7. Acceptable Product
 1. Technical Glass Products: FireLite Plus, www.fireglass.com.
 2. Substitutions: <<Refer to Section 01 25 13, Not permitted>>.
3. Laminated Safety Glass
 1. Fire-rating: 20 minutes
 2. Glass layers: Clear, annealed to ASTM C1036, pane thickness to resist lateral load according to ASTM E1300.
 3. Interlayer: polyvinyl butryl, thickness of <<0.015, 0.030, 0.045, 0.060>> inch.
 4. Impact Safety Resistance: In accordance with ANSI Z97.1 Standard and Federal Standard CPSC 16 CFR 1201.
 5. Surface Finish: Polished
4. Tempered glass
 1. Glass: Clear, ASTM C1036.
 2. Impact Safety Resistance: In accordance with ANSI Z97.1 Standard and Federal Standard CPSC 16 CFR 1201.
 3. Surface Finish: Polished

Edit following paragraphs to specify hardware sets.

19. System Hardware
 1. Continuous Hinges
 1. Steel Pinned
 1. Acceptable products:
 1. Markar <<FM200, FM300>>
 2. Substitutions: <<Refer to Section 01 25 13, Not permitted>>.
 2. Aluminum Geared
 1. Acceptable products:
 1. Pemko
 2. Substitutions: <<Refer to Section 01 25 13, Not permitted>>.
 2. Full Mortise Hinges
 1. Five-Knuckle, Oilite-bearing.
 2. Acceptable products:
 1. McKinney TA2714.
 2. Substitutions: <<Refer to Section 01 25 13, Not permitted>>.

Grip: Select one of the following options. Specify one for pull and one for push function.

20. Grip
 1. Size: Solid bar grip, ¼ inch diameter x 10 inch C to C.
 2. Clearance: 2 inches.
 3. Acceptable products:
 1. McKinney: DP05.
 2. Substitutions: <<Refer to Section 01 25 13, Not permitted>>.
21. Grip
 1. Size: Solid bar grip, ¼ inch diameter x 10 inch C to C, 90 degree offset.
 2. Clearance: 2 inches.
 3. Acceptable products:
 1. McKinney OP902.
 2. Substitutions: <<Refer to Section 01 25 13, Not permitted>>.
22. Push
 1. Size: 4 inches x 16 inches.
 2. Beveled four edges
 3. Engraved: Push.
 4. Acceptable products:
 1. McKinney P1253.
 2. Substitutions: <<Refer to Section 01 25 13, Not permitted>>.

Lever design: Select appropriate options.

23. Lever
 1. Acceptable Products:
 1. Corbin Russwin: ML2000 series x XXX trim.
 2. Sargent: 8200 series x XXX trim.
 3. Yale: 8800FL series x XXX trim.
 4. Substitutions: <<Refer to Section 01 25 13, Not permitted>>.
24. Exit Devices, Standard, Full Width
 1. Projection: 3 inches.
 2. Acceptable products:
 1. Corbin Russwin: ED5000 series x 900 trim.
 2. Sargent: 80 series x ET trim.
 3. Yale: 7000 series x 600 trim.
 4. Substitutions: <<Refer to Section 01 25 13, Not permitted>>.
25. Exit Devices, Standard, Low-Profile
 1. Projection: 1-1/2 inches.
 2. Acceptable products:
 1. Sargent: LP80 Series x ET trim.
 1. Substitutions: <<Refer to Section 01 25 13, Not permitted>>.

Functions for exit devices: Select appropriate options.

26. Functions
 1. Dogging
 1. For fire rated doors: Not available, always latched.

Dogging for non-rated accidental hazard exit devices: Select appropriate option.

27. For non-rated accidental hazard doors: Trim dogged by <<hex key, cylinder>>.
 - Passage: Operated by trim outside and push pad inside at all times.
 - Classroom: Operated by trim outside and push pad inside except when outside is locked by key from outside. Inside is always operable.
 - Storeroom: Operated from trim outside and push pad inside except when outside is locked by key from outside. Key cannot be withdrawn in unlocked position. Inside is always operable.
 - Exit Only: Operated from push pad inside. No outside trim. Inside is always operable.
 1. operable.

Functions for locksets and levers: Select appropriate options.

32. Functions for locksets:
1. Passage: Operated from either side at all times.
 1. Acceptable products:
 1. Corbin Russwin: ML2010
 2. Sargent: 8215.
 3. Yale: 8801FL
 4. Substitutions: <<Refer to Section 01 25 13, Not permitted>>.
 2. Privacy: Operated from either side except when outside trim is locked by inside turnpiece. Unlocked by operation of inside lever, turnpiece inside, or emergency key outside.
 1. Acceptable products:
 1. Corbin Russwin: ML2030.
 2. Sargent: 8265.
 3. Yale: 8802FL
 4. Substitutions: <<Refer to Section 01 25 13, Not permitted>>.
 3. Entry: Operated from either side except when outside is locked by turnpiece inside or key outside. Inside is always operable.
 1. Acceptable products:
 1. Corbin Russwin: ML2051.
 2. Sargent: 8205.
 3. Yale: 8807FL
 4. Substitutions: <<Refer to Section 01 25 13, Not permitted>>.
 4. Classroom: Operated from either side except when outside is locked by key from outside. Inside is always operable.
 1. Acceptable products:
 1. Corbin Russwin: ML2055.
 2. Sargent: 8237.
 3. Yale: 8808FL.
 4. Substitutions: <<Refer to Section 01 25 13, Not permitted>>.
 5. Storeroom: Operated from either side except when outside is locked by key outside. Key cannot be withdrawn in unlocked position. Inside is always operable.
 1. Acceptable products:
 1. Corbin Russwin: ML2057.
 2. Sargent: 8204.
 3. Yale: 8805FL
 4. Substitutions: <<Refer to Section 01 25 13, Not permitted>>.
 6. Apartment: Operated from either side except when outside is locked by key outside or key inside. Inside is always operable.
 1. Acceptable products:
 1. Corbin Russwin: ML2067.
 2. Sargent: 8243.
 3. Yale: 8847FL
 4. Substitutions: <<Refer to Section 01 25 13, Not permitted>>.
 7. Dormitory or Convalescent: Operated from either side except when outside is locked by key outside or turnpiece inside. Unlocks by operation of inside lever, turnpiece, or key.
 1. Acceptable products:
 1. Corbin Russwin: ML2065.
 2. Sargent: 8225.
 3. Yale: 8822FL.
 4. Substitutions: <<Refer to Section 01 25 13, Not permitted>>.
 8. Store Door: Operated from either side except when locked by key either side.
 1. Acceptable products:
 1. Corbin Russwin: ML2022.
 2. Sargent: 8226.
 3. Yale: 88602FL
 4. Substitutions: <<Refer to Section 01 25 13, Not permitted>>.
 9. Deadlock: Operated from either side except when both sides are locked by key outside or turnpiece inside.
 1. Acceptable products:
 1. Corbin Russwin: ML2013.
 2. Sargent: 8221.
 3. Yale: 8815.
 4. Substitutions: <<Refer to Section 01 25 13, Not permitted>>.
 10. Deadlock: Operated from either side except when both sides are locked by key outside.
 1. Acceptable products:
 1. Corbin Russwin: ML2012.
 2. Sargent: 8222.
 3. Yale: 8814-2.
 4. Substitutions: <<Refer to Section 01 25 13, Not permitted>>.

Electronic door functions: Edit the following.

33. Electronic Door Functions
1. Fail Secure: Power interruption puts mechanism into locked mode.
 1. Acceptable products:
 1. Corbin Russwin: ML20905.
 2. Sargent: 8271.
 3. Yale: 8891FL
 4. Substitutions: <<Refer to Section 01 25 13, Not permitted>>.
 2. Fail Safe: Power interruption puts mechanism into unlocked mode.
 1. Acceptable products:
 1. Corbin Russwin: ML20903.
 2. Sargent: 8270.
 3. Yale: 8890FL
 4. Substitutions: <<Refer to Section 01 25 13, Not permitted>>.
 3. Remote Unlatching: Power to solenoid unlatches door as long as power is on.
 1. Acceptable products: SAME AS FAIL SAFE --OR-- FAIL SECURE ABOVE
 1. Corbin Russwin: ML20.
 2. Sargent: 82.
 3. Yale: 87.
 4. Substitutions: <<Refer to Section 01 25 13, Not permitted>>.
 4. Electric Exit device: Exit device trim is locked by 24 volt D.C., 5.0 amp power source. Interruption of power unlocks exit device trim.
 1. Acceptable products:
 1. Corbin Russwin: 9903 / 9905 trim.
 2. Sargent: 776ET / 776ET trim.
 3. Yale: 690F / 691F trim
 4. Substitutions: <<Refer to Section 01 25 13, Not permitted>>.

Closers: Edit the following.

34. Closers, Regular Arm
1. Mounting: Surface mounted on pull side.
 2. Size: In accordance with manufacturer's published recommendations.
 3. Acceptable products:
 1. Corbin Russwin: DC6200.
 2. Norton: 7500 (Reg).
 3. Sargent: 351-O.
 4. Yale: 4400 (Reg).
 2. Substitutions: <<Refer to Section 01 25 13, Not permitted>>.
35. Closers, Parallel Arm
1. Mounting: Surface mounted on push side.
 2. Size: In accordance with manufacturer's published recommendations.
 3. Acceptable products:
 1. Corbin Russwin: DC6210.
 2. Norton: 7500 (P/A).
 3. Sargent: 351-P/A.
 4. Yale: 4400 (P/A).
 2. Substitutions: <<Refer to Section 01 25 13, Not permitted>>.

Magnetic holders: Edit the following.

36. Magnetic Holders
 1. Holding force: 20 pounds.
 2. Voltage: 24 DC.
 3. Mounting: Wall mount.
 4. Acceptable products:
 1. Rixson: 998
 2. Sargent: 1560 series
 3. Substitutions: <<Refer to Section 01 25 13, Not permitted>>.
37. Armor Plates, Half Height
 1. Mounting: Screwed to door.
 2. Height: 36 inches or to within 1/8 inch of door trim.
 3. Width: Door width less one and one half inches.
 4. Height: <<4, 6, 8, 12, 16>> inches.
 5. Material: .050" stainless steel
 6. Bevelled: 4 edges
38. Kickplates
 1. Mounting: Screwed to door.
 2. Height: <<4, 6, 8, 12, 16>> inches.
 3. Width: Door width less one and one half inches.
 4. Material: .050" stainless steel
 5. Bevelled: 4 edges
39. FINISHES
 1. Frames: Factory pre-finished painted.[Are these frames always prefinished? Are they available prime?]

Color: Edit appropriate following paragraphs

Use paragraph 2 if color is specified in Contract Documents. Delete other paragraphs.

Use paragraph 3 if color is to be selected by Architect at later date from manufacturer's standard selection. Delete other paragraphs.

Use paragraph 4 if color is to be custom color selected by Architect. Delete other paragraphs.

Colors and finishes should also be referenced in the hardware sets.

2. Color: <<Selected from manufacturer's standard colors by Architect>>.
 3. Custom color selected by Architect. <<Set up charges apply>>
- Door Faces, Interior
- Prime finish, painted by others in field
 - Factory applied, 2-part, infrared baked polyurethane paint.
 - 3. Color: <<Selected from manufacturer's standard colors by Architect>>.
 - 4. Custom color selected by Architect. <<Set up charges apply>>
 - Wood grained "CURRIStain" metal faces

Exterior doors: Include applicable paragraphs. Delete others.

6. Door Faces, Exterior
 1. Prime finish, painted by others in field
 2. Factory applied, 2-part, infrared baked polyurethane paint.
 1. Color: <<Selected from manufacturer's standard colors by Architect>>.
 2. Custom color selected by Architect. <<Set up charges apply>>
 3. <<Write in>>
7. System Hardware

Exit devices: Select one of the following options. .

1. Exit Devices, Standard, Full Width
 1. Metal: <<630 Satin Stainless Steel (US32D), 629 Bright stainless steel (US32), 612 Satin bronze (US10), 613 Oil-rubbed bronze (US10B), 605 Bright brass (US3), 606 Satin brass (US4)>>.
 2. Levers/Escutcheons: <<605 Bright brass (US3), 606 Satin brass (US4), 611 Bright bronze (US9), 612 Satin bronze (US10), 629 Bright Stainless Steel (US32), 630 Satin stainless steel (US32D)>>.
 1. Pushes: <<628 Satin anodized aluminum (US28), 629 Bright stainless steel (US32), 612 Satin bronze (US10), 613 Oil-rubbed bronze (US10B), 605 Bright brass (US3), 606 Satin brass (US4)>>.
 2. Pulls: <<628 Satin anodized aluminum (US28), 629 Bright stainless steel (US32), 612 Satin bronze (US10), 613 Oil-rubbed bronze (US10B), 605 Bright brass (US3), 606 Satin brass (US4)>>.
 3. Closers: <<Aluminum painted, Bronze painted, Dark bronze painted>>.
 4. Magnetic Holders: <<Aluminum painted, Bronze painted, Dark bronze painted>>.
 5. Mortise Cylinders, in accordance with Section 08 71 00.
8. FABRICATION
 1. Unless modified by Contract Documents, furnish integrated metal door opening assemblies to job site pre-assembled and pre-finished, with all hardware mounted and functioning in accordance with manufacturer's published specifications and applicable Code requirements.

2. Hardware installation shall be performed by factory certified assemblers, and functionality of units shall be reconciled prior to shipment.
 1. Furnish exterior units with conventional frames to be installed during wall construction. Exterior doors shall be furnished separately with hardware pre-installed.
 2. Furnish interior units as a completely functioning door assembly, allowing installation after completed wall.
3. Furnish exterior door units with required accessories for a complete installation into the frame. Accessories shall be identified by function and marked with project opening numbers.
4. Furnish interior door and frame integrated assemblies with required fasteners for complete installation into rough openings.

EXECUTION

9. **EXAMINATION**
 1. Field Conditions
 1. Prior to commencing installation, examine parts of building structure, which are to receive integrated door opening assemblies. Report, in writing, conditions which would prevent proper execution or endanger permanency of the work to the Architect.
 2. Field Dimensions
 1. Where possible, verify wall tolerances before fabrication of door systems.
 2. Notify Architect of variances with reviewed shop drawings.
 3. Corrective measures, when necessary, shall be determined and approved prior to commencing fabrication.
 4. Coordinate door opening assembly details with adjacent work to assure proper attachments, clean junctions, etc.
10. **INSTALLATION**
 1. Install work in accordance with Contract Documents and reviewed shop drawings.
 1. Deliver exterior frames to be installed by others.
 2. Exterior Frames
 1. Set plumb and square in accordance with DHI standards.
 1. Out-of-square at frame head: Not to exceed 1/16 inch.
 2. Out-of-plumb for each frame jamb: Not to exceed 1/16 inch.
 3. Out-of-alignment for each side in plan: Not to exceed 1/16 inch.
 4. Twist dimension: Not to exceed 1/16 inch.
 2. Securely anchor to wall opening.
 3. Furnish and install clips, fastenings, and anchorages and conceal unless otherwise noted.
 3. Door and Frame Assemblies
 1. Install per manufacturer's installation instructions.
 2. Adjust to freely swing without binding, sticking, or sagging, and to eliminate excessive clearances.
 4. Hardware: When installation is otherwise complete, adjust hardware for proper operation and function.

Hardware sets shall be developed for each opening as appropriate for project, preferably by an ASSA ABLOY Door Security Solutions specifications consultant. Each set should include function of lock, push side operation, pull side operation and other applicable components.

SCHEDULE

1. Hardware Groups [Suggest sample sets of openings based on vertical market channels]